A Multi-Depth Underwater Spectroradiometer for Validation of Remotely-Sensed Ocean Color and Estimation of Seawater Biogeochemical Properties, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

Remote sensing of optical properties of coastal waters provides essential information for various scientific questions & applications as monitoring biological biomass & productivity, biogeochemical carbon cycling, pollution, ecosystem health. OKSI, with Scripps Institution of Oceanography, propose developing a novel submersible instrument that provides simultaneous multi-depth (0-10 m) measurements of upwelling & downwelling radiative fluxes in the UV-VIS-NIR at high spectral resolution. The measurements are needed to support ocean color algorithm development, validation, & application to remote sensing measurement for the retrieval of biochemical & optical ocean parameters. All electronics components will be above water & the submersible will require no power or electronics. In Phase I underwater radiative transfer analysis will be conducted to establish the science requirements & translate those into sensor design. The submersible sensor system will be designed and modeled to assure that it meets the science requirements of SNR, dynamic range, & spectral resolution. Calibration procedures will be established to assure high data quality. In Phase-II the prototype instrument will be built and tested at sea & data compared to other SIO instruments. The proposed system will quantify the underwater downwelling irradiance and upwelling radiance through simultaneous measurements at several depths (plus the downwelling irradiance incident upon the sea surface), filling a major gap in technological capabilities for providing accurate light field determinations at the ocean surface from data taken within optically dynamic near-surface ocean layer. In this layer, the usage of commercial radiometers and common measurement strategies is typically inadequate. This proposed development will improve retrievals of remote-sensing reflectance and consequently information about in-water constituents/properties. The project outcome at the end of Phase-II will be at TRL 6.

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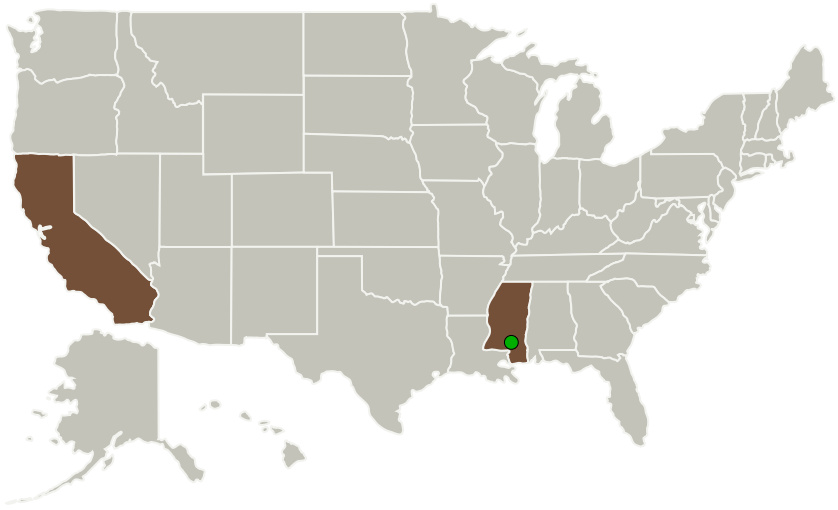
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Opto-Knowledge Systems, Inc.(OKSI)	Lead Organization	Industry	Torrance, California
Stennis Space Center(SSC)	Supporting Organization	NASA Center	Stennis Space Center, Mississippi

Primary U.S. Work Locations	
California	Mississippi

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140201)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Opto-Knowledge Systems, Inc. (OKSI)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Nahum Gat

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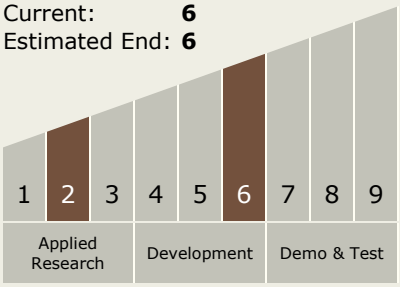
Technology Maturity (TRL)

Start: **2**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.2 Mobility
    - TX04.2.4 Surface Mobility

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System